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Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/474,299 | SCHEMMANN ET AL. | |
| | Examiner | Art Unit | |
| | David S. Kim | 2633 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *10 March 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) *5-8,13,14,17,18,20 and 22-27* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,9-12,15,16,19 and 21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 December 1999* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4-6*.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

## DETAILED ACTION

### *Election/Restrictions*

1. The reply filed on 10 March 2003 is not fully responsive to the prior Office Action because of the following omission(s) or matter(s):

Applicant responded that **claims 1-4, 9-12, 14-16, 18, 19, 21, and 23-27** read on **Species 4 (Figure 11)**. This does not appear to be the case. For example, Figure 11 does not show:

- a combiner for combining the third electronic signals into the second electronic signal (claim 14);
- numerous parts of claim 18;
- combining the carrier signals of the third electronic signals to provide the single second electronic signal (claims 23-24);
- a third frequency band having maximum carrier frequency at least equal to the minimum carrier frequency of the first frequency band plus the number of second electronic signals converted into the first optical signal times the width of the first frequency band (claims 25-27);
- the third frequency band of the third electronic signals having the same frequency range as the second frequency band of the second electronic signal (claim 26); and
- the fifth, sixth, and seventh converting steps (claim 27).

Normally, Applicant would be given one month or thirty days from the mailing date of this notice, whichever is longer, within which to supply the omission or correction in order to avoid abandonment. However, multiple notices requesting a proper election have been previously sent (Paper Nos. 7 and 9). In order to promote compact examination, Examiner treats the elected **Species 4** on its merits in this present Office Action.

2. Examiner had a telephone conversation with Mr. Michael E. Monaco on 23 September 2003. During the conversation, Mr. Monaco indicated that the election (Paper No. 13) was made **without** traverse to prosecute the invention of Species 4. Also, Examiner and Mr. Monaco discussed the differing views (see above) regarding the designation of claims that read on Species 4. It was agreed that Examiner treat the elected Species 4 on its merits in this present Office Action, according to Examiner's view on the designation of claims that read on **Species 4, claims 1-4, 9-12, 15-16, 19, and 21**. This agreement does not mean that Applicant agrees with Examiner's view on the designation of claims that read on Species 4; rather, this agreement was made to promote compact examination. Applicant still has the right to formally confirm or to protest Examiner's designation of claims in replying to this Office Action. Accordingly, **claims 5-8, 13-14, 17-18, 20, and 22-27 are withdrawn** from further consideration by the examiner at this time, 37 CFR 1.142(b), as being drawn to a non-elected invention.

***Drawings***

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "344" in Fig. 5 has been used to designate both a converting fiber hub and a fiber coming out of CFH 340. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

4. Applicant is required to submit a proposed drawing correction in reply to this Office action. However, formal correction of the noted defect may be deferred until after the examiner has considered the proposed drawing correction. Failure to timely submit the proposed drawing correction will result in the abandonment of the application.

## *Specification*

5. The abstract of the disclosure is objected to because its undue length. Correction is required. See MPEP § 608.01(b).

6. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

7. 35 U.S.C. 112, first paragraph, requires the specification to be written in "full, clear, concise, and exact terms." The specification is replete with terms which are not clear, concise and exact. The specification should be revised carefully in order to comply with 35 U.S.C. 112, first paragraph. Examples of some unclear, inexact or verbose terms used in the specification are:

In line 7 of page 26, "figure 2" is used where "figure 3" may be intended.

In line 6 of page 27, "figure 3" is used where "figure 2" may be intended.

In line 17 of page 37, "WDM 170" appears to be a typographical error (170 is not a WDM).

On page 37, line 18, "receivers 171 and 172" appears to be a typographical error (171 and 172 are not receivers).

## *Claim Objections*

8. **Claims 1, 11, and 21** are objected to because of the following informalities:

In claim 1, line 4, "on" is used where "an" may be intended.

In claim 11, line 5, "the includes" is used where ", each including" may be intended.

In claim 21, line 5, "a first electronic multicarrier signals" is used where "a first electronic multicarrier signal" may be intended.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. **Claims 2-3, 10, and 15** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

**Regarding claim 2**, claim 2 has contradictory statements that render the claim indefinite:

Lines 7-8 read, "a radio frequency of the output carrier signal is at least approximately 2 times higher that the frequency of the input carrier signal." However, lines 11-12 read, "a radio frequency of the output carrier signal is approximately 40 times higher than the frequency of the input carrier signal." The resulting claim does not clearly set forth the metes and bounds of the patent protection desired.

Line 9 reads, "the radio frequency of the input carrier signal is below 100 MHz." However, line 13 reads, "the radio frequency of the input carrier signal is approximately between 5 and 65 MHz." The resulting claim does not clearly set forth the metes and bounds of the patent protection desired.

Line 10 reads, "the radio frequency of the output carrier is between approximately 200 and 1300 MHz." However, line 14 reads, "the radio frequency of the output carrier signal is approximately between 300 and 1000 MHz." The resulting claim does not clearly set forth the metes and bounds of the patent protection desired.

**Regarding claim 3**, claim 3 has contradictory statements that render the claim indefinite:

Lines 24-26 read, "a first frequency band...a second frequency band, in which the frequency bands do not overlap." However, lines 27-29 read, "the carrier frequencies of the first frequency band are all between approximately 200 MHz and approximately 800 MHz; and the carrier frequencies of the second frequency band are all between 300 and 1200 MHz." The resulting claim does not clearly set forth the metes and bounds of the patent protection desired.

**Regarding claim 10**, claim 10 has various ranges that render the claim indefinite:

Line 4 reads, "the frequency band of the first frequency band is more than an octave." However, line 18 reads, "the first band width is more than 3 octaves." The resulting claim does not clearly set forth the metes and bounds of the patent protection desired.

Line 5 reads, "the frequency band width of the second frequency band is less than an octave." However, line 6 reads, "the frequency band width of the second frequency band is less than half an octave." Further, line 20 reads, "the second band width is less than half an octave." The resulting claim does not clearly set forth the metes and bounds of the patent protection desired.

Lines 7-8 read, "the minimum frequency of the second band is more than the maximum frequency of the first band." However, lines 9-10 read, "the minimum frequency of the second band is more than 2 times higher than the maximum frequency of the first band." Further, lines 11-12 read, "the minimum frequency of the second band is more than approximately 6 times higher than the maximum frequency of the first band." The resulting claim does not clearly set forth the metes and bounds of the patent protection desired.

Lines 13-14 read, "the maximum frequency of the first frequency band is below 100 MHz and the minimum frequency of the second band is above 200 MHz." However, lines 15-16 read, "the maximum frequency of the first frequency band is below approximately 65 MHz and the

minimum frequency of the second band is above approximately 300 MHz." Further, lines 17-20 read, "the maximum frequency of the first frequency band is approximately above 5 MHz and approximately below 65 MHz...and the minimum frequency of the second band is approximately above approximately 200 MHz and approximately below 1000 MHz." The resulting claim does not clearly set forth the metes and bounds of the patent protection desired.

**Regarding claim 15**, claim 15 recites the limitation "the optical signal" in line 15. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. **Claims 1-4** are rejected under 35 U.S.C. 103(a) as being unpatentable over Pidgeon (U.S. Patent No. 5,153,763).

**Regarding claim 1**, Pidgeon discloses:

Optical apparatus (hub version in col. 1, line 64 – col. 2, line 13), comprising:

an input path (input to transmitter 10 in Fig. 1) carrying an input carrier signal modulated by an information signal, the input carrier signal having a radio frequency (col. 3, lines 3-18);

an output optical path (output from transmitter 10 in Fig. 1) carrying an output light beam modulated by an output carrier signal modulated by the same information signal as the input carrier signal, the output carrier signal having a higher (col. 4, lines 1-23) radio frequency than the input carrier signal; and

up-converter means (Figs. 2-3) for converting the input carrier signal carrying the information signal into the output light beam carrying the higher frequency output carrier signal carrying the same information signal.

Pidgeon does not expressly disclose:

said input path being an optical path, said optical path carrying an input light beam modulated by said input carrier signal;

said up-converter means being an optical up-converter means for converting said input light beam.

However, optical paths, such as the fiber paths in Pidgeon (Figures), are extremely well known and common in the art. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to arrange said input path of the hub of Pidgeon to interface with the head end of Pidgeon via an optical path that carries an input light beam modulated by said input carrier signal. One of ordinary skill in the art would have been motivated to do this since doing so would enable well-known benefits of using an optical path from the head end to the hub of Pidgeon, such as low loss and high bandwidth (col. 1, lines 64-66). Accordingly, modified with such an input optical path, this input optical path would carry the input light beam to the input of the up-converter means in the hub of Pidgeon.

Additionally, at the time the invention was made, it would have been obvious to a person of ordinary skill in the art to incorporate arrange the up-converter means to include an optical receiver to convert the input light beam into a corresponding input electronic signal. One of ordinary skill in the art would have been motivated to do this in order to interface the input light beam with the up-converter means of Pidgeon (the apparatuses of Figs. 2-3 utilize input electronic signals). Modified as such, the up-converter means would convert said input light beam to said output light beam.

**Regarding claim 2**, Pidgeon discloses:

The apparatus of claim 1 in which:

the apparatus further comprises: an input coupler for connecting an input optical fiber to the input optical path; and an output coupler for connecting an output optical fiber to the output optical path (input and output couplers are conventional for connecting fibers and paths);

a wavelength of the input or output light beams is between 1220 and 1360 nm or between 1480 and 1620 nm (col. 3, lines 27-30);

a radio frequency of the output carrier signal is at least approximately 2 times higher than a radio frequency of the input carrier signal (Figs. 2-3);

the radio frequency of the input carrier signal is below 100 MHz (Figs. 2-3) and;

the radio frequency of the output carrier signal is between approximately 200 and 1300 MHz (Figs. 2-3);

the radio frequency of the input carrier signal is approximately between 5 and 65 MHz and the radio frequency of the output carrier signal is approximately between 300 and 1000 MHz (Figs. 2-3);

the optical apparatus further comprises one or more additional input optical paths (Note multiple input paths in Figs. 1 and 3. In view of the treatment of claim 1, multiple input paths correspond to multiple input optical paths.) providing a plurality of input optical paths carrying

respective input light beams modulated by respective input carrier signals modulated by respective information signals, the respective input carrier signals having radio frequencies; and the optical up-converter means convert the plurality of the input light beams carrying the input carrier signals carrying the information signals into the output light beam carrying the higher frequency output carrier signals carrying the same information signals;

the optical apparatus further comprises an output optical path (output from transmitter 10 in Fig. 1) providing an output optical path carrying a respective output light beam modulated by respective output carrier signals modulated by the same information signals as corresponding input carrier signals, the respective output carrier signals having a higher radio frequency than the corresponding input carrier signals; and

the optical up-converter means convert the plurality of the input light beams carrying the input carrier signals carrying the information signals into the plurality of output light beams carrying the higher frequency output carrier signals carrying the same information signals.

Pidgeon does not expressly disclose:

the radio frequency of the output carrier signal is more than approximately 40 times higher than the frequency of the input carrier signal; and

the optical apparatus further comprises one or more additional output optical paths providing a plurality of output optical paths carrying respective output light beams.

However, it is well known that the frequency of CATV carrier signals begin as low as 5 MHz (Applicant's specification, page 3, line 14) for return transmissions back to the head end. While Pidgeon does not expressly disclose applying the benefits of the up-converting means to return transmissions back to the head end of Pidgeon, it would have been obvious to a person of ordinary skill in the art to do so at the time the invention was made. One of ordinary skill in the art would have been motivated to do this in order to eliminate distortion in the return transmissions, as well (col. 1, lines 33-38; col. 2, lines 15-42). Accordingly, the radio frequency

of the output carrier signal (~600 MHz+ in col. 4, line 10) would be more than approximately 40 times higher than the frequency of the input carrier signal (~600 MHz > 40 x 5 MHz).

Additionally, it is well known and conventional for hubs to connect to more than one node. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to connect the hub of Pidgeon to more than one node. One of ordinary skill in the art would have been motivated to do this in order to increase the distribution reach of a CATV network. Accordingly, the optical apparatus in the hub of Pidgeon would comprise one or more additional output optical paths.

**Regarding claim 3**, Pidgeon discloses:

The apparatus of claim 1 in which:

the input and output light beams are multicarrier optical signals in which light beams are modulated by a respective multitude of carrier signals, the multitude carrier signals of the same light beam have mutually different radio frequency (col. 2, lines 15-42);

the carrier signals of the same light beam are modulated by different respective information signals (col. 2, lines 15-42);

the output carrier signals are modulated by the same respective information signals as corresponding input carrier signals having lower frequencies (col. 4, lines 1-31);

the output carrier signals have different respective radio frequencies all within a frequency band with a band width of approximately less than one octave (col. 4, lines 5-8), so that, the maximum frequency of a carrier in the band is less than or equal to approximately 2 times the minimum frequency of a carrier in the band, so that, essentially all second order distortions of the multicarrier signal can be filtered out (col. 4, lines 23-25);

the output carrier signals have radio frequencies within a frequency band with a width of approximately less than half an octave (col. 4, lines 56-62; note that 822 MHz – 654MHz = 168 MHz < 327 MHz = 654 MHz/2), so that, the maximum frequency of a carrier in the band is less

than or equal to approximately 1.5 times the minimum frequency of a carrier in the band, so that, essentially all fourth order distortions of the multicarrier signal can be filtered out (col. 5, lines 3-5, "higher order harmonic distortion" includes fourth order distortions);

the multiple carrier signals of the input light beam have radio frequencies in a frequency band extending in a portion of the range between approximately 5 and 65 MHz and the corresponding carrier signals in the output light beam have radio frequencies in a band with a minimum carrier frequency above 400 MHz (Figs. 2-3);

the apparatus further comprises one or more additional output optical paths (output from combiners 54 and 56 in Fig. 3) to provide a plurality of output optical path carrying respective output light beams which are multicarrier optical output signals including a first output light beam modulated by a multitude of carrier signals in a first frequency band (band out of laser diode transmitter 76 in Fig. 3) and a second output light beam modulated by a multitude of carrier signals in a second frequency band (band out of laser diode transmitter 64 in Fig. 3), and in which the frequency bands do not overlap;

the carrier frequencies of the first frequency band are all between approximately 200 MHz and approximately 800 MHz; and the carrier frequencies of the second frequency band are all between 300 MHz and 1200 MHz;

Pidgeon does not expressly disclose:

the wavelengths of two of the output light beams are separated by a difference between 0.4 nm and 1.6 nm.

However, this wavelength range is known to correspond to the wavelength spacing between WDM channels. WDM is an extremely well known and common transmission technique in the art. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to implement WDM techniques in the apparatus of Pidgeon. One of ordinary skill in the art would have been motivated to do this to multiplex different

output light beams on one common fiber link instead of an individual fiber link for each output light beam, thus avoiding excess fiber installations, lowering fiber maintenance costs, and improving economical fiber bandwidth usage.

**Regarding claim 4,** Pidgeon discloses:

The apparatus of claim 1 in which:

the optical up-converter means includes:

optical receiver means (see treatment of claim 1) for converting the input light beam carrying the input carrier signal into an input electronic current signal carrying the same input carrier signal;

electronic up-converter means (Figs. 2-3) for converting the input electronic current signal modulated by the input carrier signal modulated by the information signal into an output electronic current signal modulated by the higher frequency output carrier signal modulated by the same information signal; and

optical transmitter means (transmitters in Figures) for converting the output electronic current signal carrying the higher frequency carrier signal into the output light beam carrying the same higher frequency output carrier signal.

14. **Claims 9-12, 15-16, 19, and 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Wright (U.S. Patent No. 5,841,468) in view of Pidgeon.

**Regarding claim 9,** Wright discloses:

An up-converter, comprising:

receiving means (frequency stackers 48 in Figures) for receiving a first plurality of multicarrier electronic first signals, each including a multitude of first carrier signals modulated by different respective information signals, the frequency of the carrier signals in the same multicarrier signal are all different, the frequencies of a plurality of the carrier signals of

different first electronic signals are approximately the same, the first carrier signals of each first electronic signal being within the same first frequency band;

conversion means (up converters in Figures) for converting and combining the respective first signals into a single multicarrier electronic second signal including a multitude of second carrier signals of mutually different respective frequencies and modulated respectively by the same information signals as the first signals, the frequencies of the second carrier signals are within a second frequency band; and

transmission means (transmitter 50 in Figures) for transmitting the second signal.

Wright does not expressly disclose:

the maximum carrier frequency of the second band being at least 2 times higher than the maximum carrier frequency of the first band.

Pidgeon teaches a transmission method that incorporates frequency bands with such a relation (Pidgeon, abstract). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to implement the transmission method of Pidgeon to the up-converters of Wright. One of ordinary skill in the art would have been motivated to do this to reduce distortion (Pidgeon, abstract)

**Regarding claim 10**, Wright in view of Pidgeon discloses:

The up-converter of claim 9 in which:

the information signals of each first signal modulate respective second carrier signals with frequencies within a different subband of the second frequency band (Wright, col. 8, lines 46-48, col. 9, lines 48-52; Pidgeon, Figs. 2-3);

the frequency band width of the first frequency band is more than an octave (5-42 MHz > 3 octaves);

the frequency band width of the second frequency band is less than an octave (Pidgeon, 654-1150 MHz < one octave);

the frequency band width of the second frequency band is less than half an octave (Pidgeon, 654-822 MHz < half an octave);

the minimum frequency of the second band is more than the maximum frequency of the first band (Pidgeon, 654 MHz > Wright, 42 MHz);

the minimum frequency of the second band is more than 2 times higher than the maximum frequency of the first band (Pidgeon, 654 MHz > Wright, 84 MHz = 2 x 42 MHz);

the minimum frequency of the second band is more than approximately 6 times higher than the maximum frequency of the first band (Pidgeon, 654 MHz > Wright, 252 MHz = 6 x 42 MHz);

the maximum frequency of the first frequency band is below 100 MHz (Wright, 42 MHz < 100 MHz) and the minimum frequency of the second band is above 200 MHz (Pidgeon, 654 MHz > 200 MHz);

the maximum frequency of the first frequency band is below approximately 65 MHz (Wright, 42 MHz < 65 MHz) and the minimum frequency of the second band is above approximately 300 MHz (Pidgeon, 654 MHz > 300 MHz); and

the maximum frequency of the first frequency band is approximately above 5 MHz and approximately below 65 MHz (Wright, 5 MHz < 42 MHz < 65 MHz), and the first band width is more than 3 octaves (Wright, 5-42 MHz > 3 octaves), and the minimum frequency of the second band is approximately above 200 MHz and approximately below 1000 MHz (Pidgeon, 200 MHz < 654 MHz < 1000 MHz) and the second band width is less than half an octave (Pidgeon, 654-822 MHz < half an octave).

**Regarding claim 11**, Wright in view of Pidgeon discloses:

The up-converter of claim 9 in which:

the receiving means (Figs. 2A and 3, col. 2, lines 21-41) communicates with respective coaxial cable networks to receive the first plurality of first electronic signals;

the conversion means includes electronic frequency converters (up converters in Figs. 2A and 3, col. 4, lines 17-36) for converting the respective first electronic signals into different respective third multicarrier electronic signals the includes a portion of the second carrier signals with frequencies within a subband of the second frequency band; and a combiner for combining the third electronic signals into the second electronic signal; and

the up-converter further comprises an optical transmitter for converting the single second electronic signal into a first multicarrier optical signal (col. 10, line 59 – col. 11, line 3).

**Regarding claim 12**, Wright in view of Pidgeon discloses:

The up-converter of claim 9 in which:

the up-converter further comprises an optical transmitter (transmitter 50 in Figures, col. 10, line 59 – col. 11, line 3) for converting the single second electronic signal into a first multicarrier optical signal; and

the conversion means includes:

first frequency converters (up converters in Figs. 2A and 3, col. 4, lines 17-36) for converting the respective first electronic signals into different respective third multicarrier electronic signals, each including a multitude of third carrier signals, the frequencies of the third carrier signals of each third electronic signal being within a different subband of a third frequency band;

a combiner (note combined output from frequency stackers in Figs. 2A and 3) for combining the third electronic signals into a single fourth multicarrier electronic signal with third carrier signals in the third frequency band;

first optical transmitter (transmitter 50 in Figs. 2A and 3, col. 10, line 59 – col. 11, line 3) for converting the fourth electronic signal into a first multicarrier optical signal;

an optical receiver (receivers in Figs. 2B and 4) for converting the first optical signal into a fifth multicarrier electronic signal;

a second frequency converter (up converters in Figs. 2B and 4) for converting the fifth electronic signal into the second electronic signal with second carrier signals in the second frequency band (Pidgeon, Figs. 2-3); and

a second optical transmitter (transmitter 50 in Figs. 2B and 4, col. 10, line 59 – col. 11, line 3) for converting the single second signal into a second multicarrier optical signal.

Wright in view of Pidgeon does not expressly disclose:

the maximum frequency of the third frequency band being at least approximately the minimum frequency of the first frequency band plus the frequency band width of the first frequency band times the number of first multicarrier signals in the first plurality of signals; and

the minimum frequency of the second frequency band being higher than the maximum frequency of the third frequency band.

However, Pidgeon teaches the assignment of different frequency bands for different stages of transmission (Pidgeon, col. 4, lines 17-36, col. 7, lines 10-24). First, at the time the invention was made, it would have been obvious to a person of ordinary skill in the art to assign the maximum frequency of the third frequency band as written in claim 12. One of ordinary skill in the art would have been motivated to do this so that the transmission stage associated with the third frequency band of Pidgeon would have enough bandwidth to accommodate all the incoming channels in the first plurality of signals. Second, at the time the invention was made, it would have been obvious to a person of ordinary skill in the art to assign the minimum frequency as written in claim 12. One of ordinary skill in the art would have been motivated to do this so that the frequency bands of the corresponding transmission stages do not overlap and interfere with each other. This kind of assignment of frequency bands leads to isolation of the signals as they progress upwardly through the network of Wright (col. 2, lines 17-36, col. 7, lines 10-24, col. 8, lines 16-31).

**Regarding claim 15**, Wright in view of Pidgeon discloses:

A hybrid cable fiber node (col. 2, lines 54-61) using the up-converter of claim 9, comprising:

an enclosure containing the apparatus of the node (service sites 16 in Fig. 1);

means for connecting a plurality of coaxial cable networks to the node (col. 2, lines 45-65);

up-converter means (up converters in Figs. 2A and 3, col. 4, lines 17-36) for receiving a plurality of multicarrier first electronic return signals from respective coaxial cable networks, the multicarrier signals each including a multitude of carrier signals modulated by different respective information signals, the frequency of each carrier signal in the same multicarrier signal being different, with frequencies of the carrier signals of all the first return signals being within the same first frequency band, and for converting the respective first electronic return signals into different respective second electronic return signals with frequencies of the carrier signals of each second return signal within a different subband of a second frequency band with a frequency band width that is less than one octave (Pidgeon, Figs. 2-3);

first electronic combining means (note combined output from frequency stackers in Figs. 2A and 3) for combining the second electronic return signals into a single third electronic return signal with frequencies of carrier signals within the second frequency band;

means for connecting a first optical fiber for carrying the optical signal from the node (Fig. 1, col. 2, lines 54-55); and

optical transmitter means (transmitter 50 in Figs. 2A and 3, col. 10, line 59 – col. 11, line 3) for converting the third electronic return signal into a first optical return signal.

**Regarding claim 16**, Wright in view of Pidgeon discloses:

The node of claim 15, in which:

the node further comprises: first optical receiver (receivers in Figs. 2A and 3) means for converting a forward optical signal into a respective electronic forward signal in one or more of

the coaxial cable networks; and filter means (group transceivers 40 in Figs. 2A and 3) for separating the first electronic return optical signals from the electronic forward signals in respective coaxial cable networks and providing the first return signals to the up-converter means.

**Regarding claim 19**, Wright in view of Pidgeon discloses:

A method of providing optical communications, comprising the steps of

providing an electronic multicarrier communication signal (signal to transmitter 50 in Figs. 2A and 3);

converting (transmitter 50 in Figs. 2A and 3, col. 10, line 59 – col. 11, line 3, col. 4, lines 17-36) the multicarrier electronic communication signal into a first multicarrier optical communication signal including a multitude of carrier signals modulated by respective information signals, with the frequencies of the carrier signals different from each other and within a first frequency band; and

converting (Pidgeon, see treatment of claim 1 above) the first multicarrier optical signal into a second multicarrier optical signal including a multitude of carrier signals with frequencies in a second frequency band with a minimum frequency higher than a maximum frequency of the first frequency band.

**Regarding claim 21**, Wright in view of Pidgeon discloses:

The method of providing optical communications, of claim 19, comprising the steps of:

providing a respective multitude of customer interface units connected to each of a multitude of coaxial cable networks (Fig. 1, col. 5, lines 48-60);

generating a first electronic multicarrier signals in each of the coaxial cable networks (col. 1, lines 50-57), using the multitude of the customer interface units connected to each

network, with the frequencies of carrier signals of the first electronic signal in each coaxial network in the same first frequency band (col. 2, lines 44-45);

providing one or more hybrid fiber cable nodes (Figs. 2A and 3, col. 5, lines 54-60);

providing one or more optical fibers (col. 5, lines 52-54);

converting one or more forward multicarrier optical signals from one of the optical fibers into forward multicarrier electronic signals in the coaxial cable networks (col. 5, lines 57-60);

separating the multitude of first electronic signals in the coaxial cable networks into a multitude of separated first electronic signals in the nodes (Fig. 1, col. 1, lines 37-39);

first converting (Pidgeon, Figs. 2-3) a first plurality of separated first electronic signals in the nodes into a single second electronic multicarrier signal with frequencies of carrier signals in a second frequency band having a minimum carrier frequency higher than a maximum carrier frequency of the first frequency band and a width of the second frequency band is less than one octave; and

second converting the second electronic signal into a first optical multicarrier signal (Pidgeon, transmitters in Figs. 2-3) in a first one of the optical fibers, with frequencies of carrier signals in the second frequency band.

## *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David S. Kim whose telephone number is 703-305-6457. The examiner can normally be reached on Mon.-Fri. 9 AM to 5 PM (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 703-305-4729. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4750.

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